in the present paper is to determine this point by the discussion of several years' observations of the tides at Plymouth and at Bristol. The calculations for the former place were executed by Mr. Dessiou and Mr. Ross in the Hydrographer's Office at the Admiralty; the calculations for Bristol were performed by Mr. Bunt, in virtue of a grant of money from the British Association. The result of these discussions is, that a very regular form and good approximation for the semimenstrual inequality may be obtained from the observations of one year; that the existence of the lunar parallax corrections appears very clearly in the observations of one year; and that its value may be determined from a series of three or four years. The lunar declination corrections are more irregularly given by short series of observations; but in a series of four or five years, the general form and approximate value of the corrections become manifest. In the course of these calculations such questions as the following were proposed, and their solution attempted: 1. To which transit of the moon ought we to refer the tide? It appears that the transit which produces the best accordance with theory, is that which Mr. Lubbock terms transit B, which is an epoch about 42 hours anterior to the high water at Bristol and Plymouth. 2. How does a change of the epoch affect, first, the semimenstrual inequality; secondly, the parallax correction of the time; thirdly, the declination correction of the times; fourthly, the parallax correction of heights; and fifthly, the declination correction of the heights? 3. Does the parallax corrections of height vary as the parallax? 4. Does the parallax correction of time vary as the parallax? 5. Does the declination correction of the heights vary as the square of the declination? 6. Does the declination correction of time vary as the square of the declination? 7. Can the laws of the corrections be deduced from a single year? 8. Are there any regular differences between the corrections of successive years? 9. Do the corrections at different places agree in themselves? It does not appear that any change of the epoch will produce an accordance of the observed laws with the theory, some of the inequalities requiring one epoch for this purpose, and some requiring another. The inequalities in different years and different places are also compared.

Mr. Whewell remarks, that since it has now been shown that good tide tables may be obtained from short series of observations, his researches with regard to the determination of the lunar corrections may be concluded; and the proper mode of farther prosecuting the subject, would be to have tide observations at several stations, each observatory reducing its own observations, and thus constantly improving the tables, as is practised in other branches of Astronomy.

"Researches in Embryology." *First Series.* By Martin Barry, M.D., F.R.S.E., Fellow of the Royal College of Physicians in Edinburgh. Communicated by P. M. Roget, M.D., Sec. R.S.

This paper is divided into two parts. In the first part the author describes the origin and structure of the ovisac, a vesicle common

to all vertebrated animals, but hitherto regarded as the inner membrane of the "folliculus Graafianus" in Mammalia, and by some authors denominated the "chorion" in other Vertebrata. He also describes the real nature of the "folliculus Graafianus," and its relation to the calyx of the Bird; the germinal vesicle and its contents, as being the most primitive portion of the ovum; the order of formation of the several other parts of the ovarian ovum; and the true chorion of Mammalia as being a structure superadded within the ovary.

In the second part the author describes a granulous tunic of the ovum of Mammalia not hitherto observed; the manner of origin of the "membrana granulosa" of authors; the different situations of the ovum in the Graafian vesicle at certain periods *ante coitum*, not hitherto observed; and certain structures by means of which the ovum is made to occupy these several situations.

The following are the principal facts made known by Dr. Barry in this memoir; but other facts are also mentioned, which he intends to make the subject of a future communication. In Mammalia and in Birds the germinal vesicle and its contents are those parts of the ovum which are first formed. The germinal vesicle at an early period is surrounded by peculiar granules, forming an envelope not hitherto described. The ovum of all vertebrated animals is contained in a vesicle (the "chorion" of some authors, found in Birds, Amphibia, and Fishes), which is essentially the same in structure wherever found, and which he thinks it desirable universally to denominate an *ovisac*. This vesicle is the "couche *interne*" of the Graafian vesicle, as described by Professor Baer. The Graafian vesicle of Mammalia is nothing more than an ovisac that has acquired a covering or tunic, susceptible of becoming highly vascular, which covering is the "couche *externe*" of the Graafian vesicle as described by Baer. The ovisac of Birds, Amphibia, and Fishes ("chorion" of some authors), acquires in like manner a covering or tunic, susceptible of becoming highly vascular; and by the union of the ovisac with this covering, there is constituted a structure analogous to the Graafian vesicle of Mammalia. The quantity of yelk in the former being large, that portion of the ovary which contains the structure here referred to (as analogous to the Graafian vesicle of Mammals) becomes pendent; and now the united coverings of the yelk-ball,—viz. the ovisac, its external tunic, the ovarian stroma, and the peritoneal investment,—are together called the *calyx*. From this it will be obvious that the Graafian vesicle is not a structure peculiar to Mammalia, as it has been supposed.

The ovisac has at first an elliptical or ellipsoidal form, becomes more spherical, and in Mammalia is often met with somewhat tapered at one end. The structure of the ovisac in some of the Mammalia may be examined when it does not exceed in length the 50th or even the 100th part of a Paris line, that is, in the latter case, the 1125th of an English inch. Myriads of ovisacs with their contents are formed that never reach maturity. Some of the ovisacs which do not reach maturity are situated in the parietes of Graafian

vesicles in Mammalia, or of the corresponding structures in other Vertebrata; being sometimes formed in this situation, and sometimes included within the covering which the larger ovisac acquires. The minute ovisacs so situated the author proposes to denominate *parasitic* ovisacs. The ovisac is often found in a cavity proper to itself, with the walls of which it has no organic union. The granules forming the envelope of the germinal vesicle above referred to, and subsequently found in the fluid of the ovisac, are very peculiar in their appearance, contain a nucleus, and sometimes also a pellucid fluid, and are intimately connected with the evolution of the ovum. These granules are present in largest quantity in the ovisac of Mammalia; yet granules essentially the same exist in an early stage in the ovisac of Birds, and are sometimes met with in that of Fishes.

A continual disappearance of ova, and a formation of others, are observable even at a very early age. The ovum of Mammalia when completely formed is at first situated in the *centre* of the ovisac. It is at this period supported in the centre of the ovisac by an equable diffusion of granules throughout the fluid of the latter. The ovisac about the same time begins to acquire a covering or tunic, by which addition, as already stated, there is constituted a Graafian vesicle; and of the latter, the ovisac is now the inner membrane. After this period, then, it is proper to speak, not of an ovisac, but of a Graafian vesicle. The peculiar granules of the Graafian vesicle arrange themselves to form three structures, viz. the *membrana granulosa* of authors, and two structures not hitherto described, one of which the author proposes to name the *tunica granulosa*, and the other, which is rather an assemblage of structures than a single structure, the *retinacula*. The tunica granulosa is a spherical covering proper to the ovum, and its presence explains why the outer line in the double contour of the thick chorion has remained so long unobserved. At a certain period this tunic, in some animals at least, is seen to have tail-like appendages, consisting of granules similar to its own. The retinacula consist of a central mass containing the ovum in its tunica granulosa, and of cords or bands extending from this central mass to the membrana granulosa. These structures at a certain period became invested by a membrane. The offices of the retinacula appear to be,—first, to suspend the ovum in the fluid of the Graafian vesicle,—next, to convey it to a certain part of the periphery of this vesicle,—and subsequently to retain it in the latter situation, and also to promote its expulsion from the ovary. The particular part of the periphery of the Graafian vesicle to which the ovum is conveyed, is uniformly that directed towards the surface of the ovary. The mass of granules escaping with the ovum on the bursting of a Graafian vesicle under the compressor, is composed chiefly of the tunica granulosa and the ruptured retinacula. The "cumulus" of Professor Baer is made up of the parts called by Dr. Barry the tunica granulosa and the central portion of the retinacula; and the band-like portions, collectively, of what Dr. Barry calls the retinacula, mainly contribute to produce the appearance denominated the "flat disc" by Professor Baer.

In Mammalia a thick and highly transparent membrane,—the true chorion,—is formed external to the proper membrane of the yelk, while the latter is in the ovary. The inner part of the substance of the chorion in its early stages is in a fluid state, so that the yelk-ball moves freely in it; but it subsequently acquires more consistence. There is not any structure corresponding to the chorion in the *ovary* of other vertebrated animals.

The following appears to be the order of formation, as to time, of the more permanent parts of the ovum and the Graafian vesicle in Mammalia, viz.:

1. The germinal vesicle, with its contents, and its envelope of peculiar granules.
2. The proper membrane of the ovisac, which forms around this envelope of granules.
3. The yolk, which forms around the germinal vesicle.
4. The proper membrane of the yolk, which makes its appearance while the yolk is still in an incipient state.
5. The chorion.
6. The covering or tunic of the ovisac; and about the same time, the peculiar granules of the ovisac arrange themselves to form,
   - The tunica granulosa,
   - The retinacula, and
   - The membrana granulosa.

Such of these structures as are present in the ovary of other Vertebrata, appear to originate in the same order as to time.

"Contributions to the Physiology of Vision." By Charles Wheatstone, Esq., F.R.S., Professor of Experimental Philosophy in King's College, London. *Part the First.* "On some remarkable and hitherto unobserved Phenomena of Binocular Vision."

The author first shows that the perspective projections of an object upon the two retinæ differ according to the distance at which the object is placed before the eyes; if it be placed so distant that to view it the optic axes must be parallel, the two projections are precisely similar; but if it be placed so near that to regard it the optic axes must converge, a different perspective projection is presented to each eye; and these perspectives become more dissimilar as the convergence of the optic axes becomes greater. Notwithstanding this dissimilarity between the two pictures, which is in some cases very great, the object is still seen single; contrary to the very prevalent metaphysical opinion, that the single appearance of objects seen by both eyes is owing to their pictures falling on corresponding points of the two retinæ. After establishing these principles, the author proceeds to ascertain what would result from presenting the two monocular perspectives, drawn on plane surfaces, to the two eyes, so that they shall fall on the same parts of the two retinæ as the projections from the object itself would have fallen. Several means are described by which this may be accomplished; but the author especially recommends for this purpose an apparatus called by